Draft 2003 PM 10 Plan

Workshops

April 7, 9 & 10, 2003

San Joaquin Valley
Air Pollution Control District

Today's Agenda

- PM10 Plan Overview
- Emission Inventory
- Significant Source/BACM Analysis
- Control Strategy
- Modeling for the PM10 Plan
- Contingency/Further Study Measures
- Plan Adoption/Submittal Schedule
- Questions and Comments

What is the PM10 Plan?

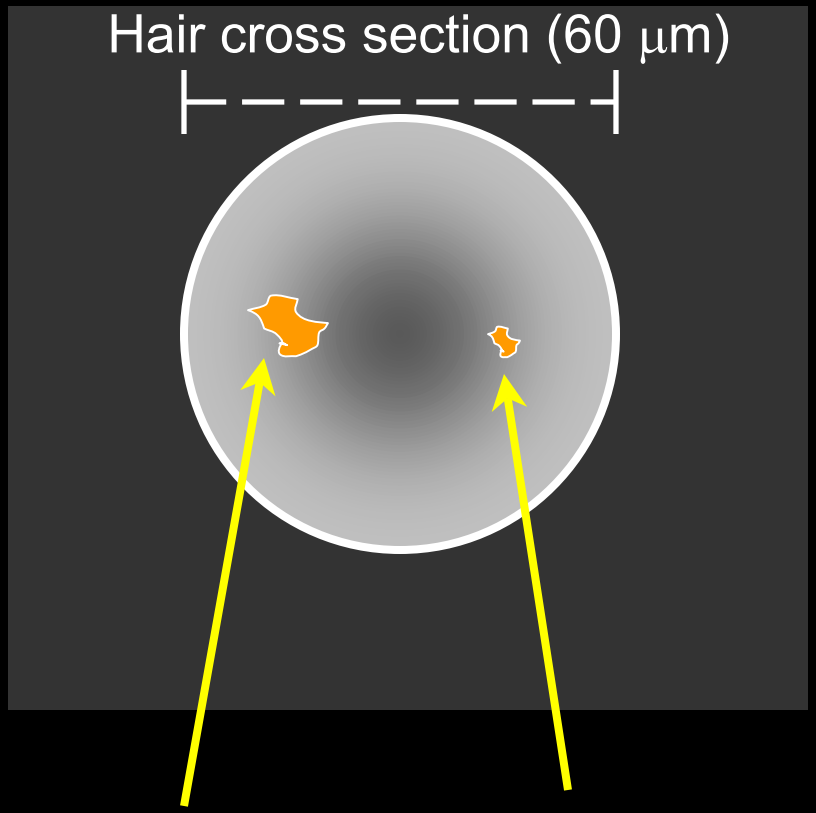
- The PM10 Plan is the District's strategy or blueprint for achieving the federal air quality standards for particulate matter less than 10 microns in diameter (PM10)
- The PM10 Plan will become part of California's State Implementation Plan (SIP) required by the federal Clean Air Act
- The plan is implemented with rules, regulations, and programs, by the District, the state and federal government, and local jurisdictions

SAN JOAQUIN VALLEY AIR BASIN

What is PM 10?

- PM10 = particles 10 microns and smaller
- How small is 10 microns?

Human Hair
(60 μm diameter)

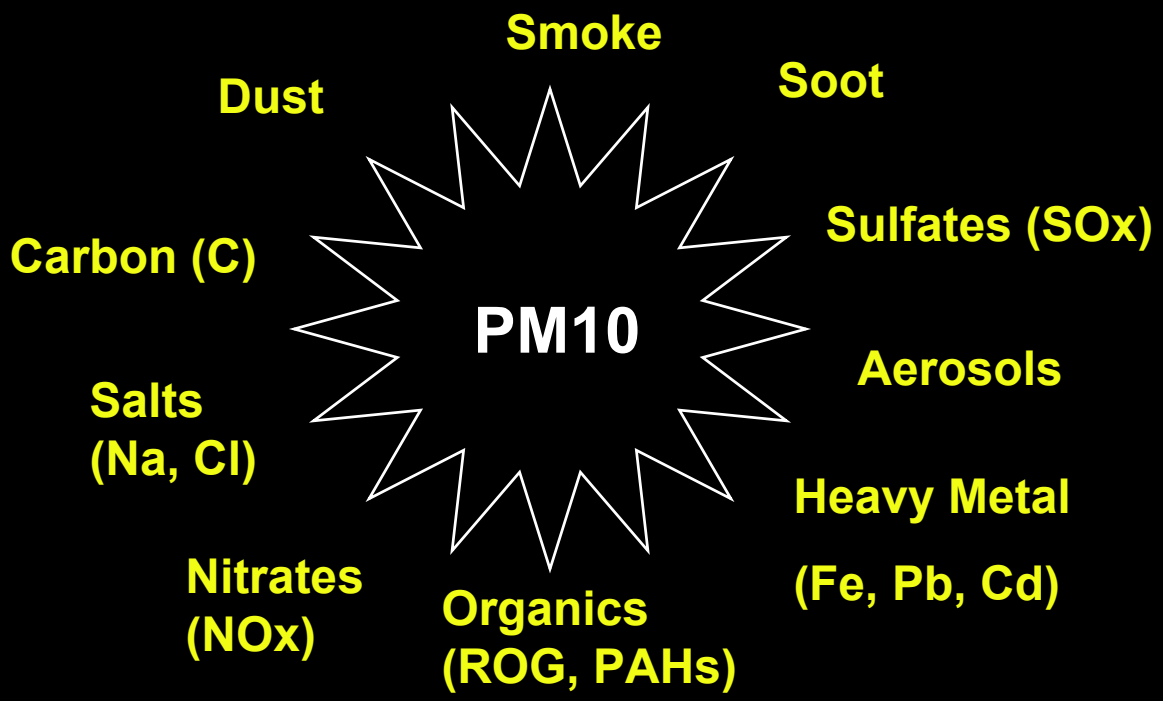


PM10
(10 μm)

PM2.5
(2.5 μm)

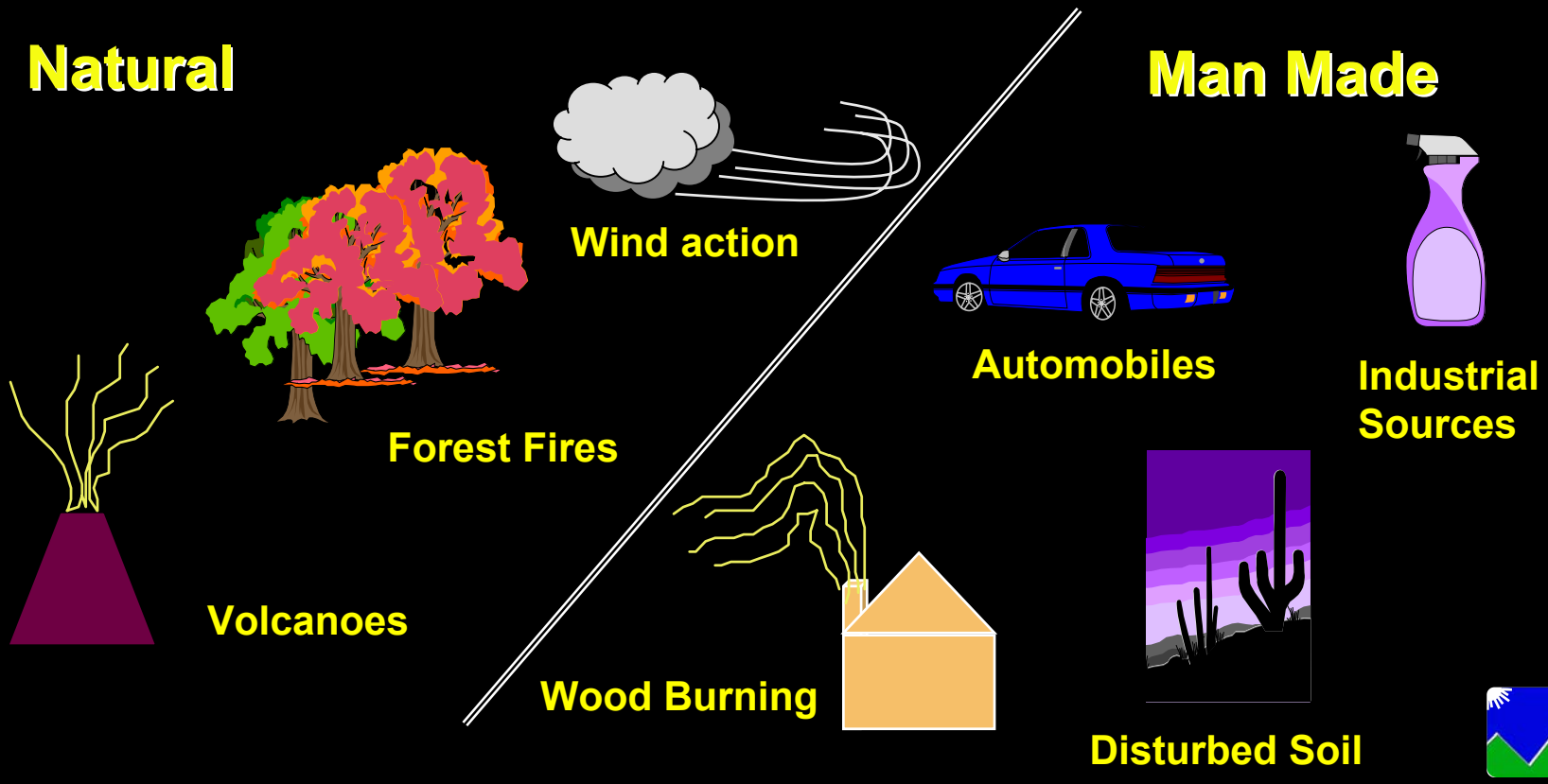
PM 10 is a "Grab Bag" of Pollutants

- A Complex Mixture
- Elements & Compounds
- Composition Varies
- Depends on Sources

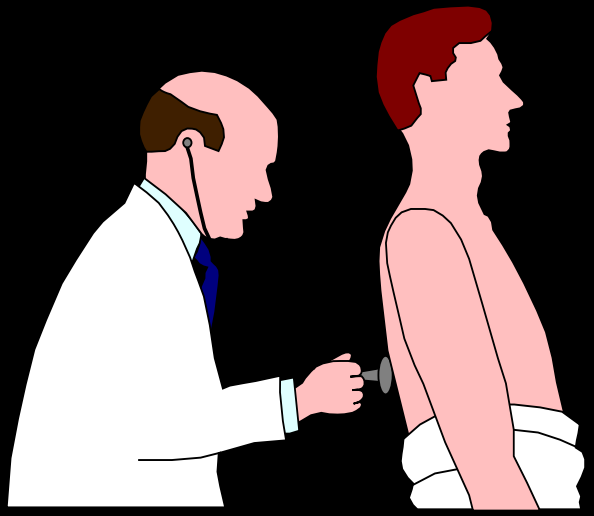


PM Takes Several Forms and Comes From Many Sources

- Directly Emitted -- Primary
- Formed in Atmosphere -- Secondary



What Are The Health Effects Of PM Air Pollution?



- Increases **Asthma Attacks**
- Reduces **Lung Function**
- Aggravates **Bronchitis**
- Results in **Respiratory Disease**
- Can Cause **Premature Death**

- **Effects are immediate and long term**

PM10 Plan Sanctions "Clock"

- Sanction clock started when 1997 PM10 Plan withdrawn in Feb. 2002
- August 28, 2003, 2-to-1 emission offsets for all new or modified major sources
- February 28, 2004, highway funding moratorium
- February 28, 2004, Federal Implementation Plan (FIP)

PM 10 Planning Requirements

- Must show **5% per year reduction** in PM10 or PM10 precursor emissions due to failure to attain December 31, 2001 - achieved
- New plan **demonstrating attainment** at earliest practicable date – Modeling shows 2010
- Must include Best Available Control Measures **(BACM)** for area sources and Best Available Control Technology **(BACT)** for stationary sources - provided
- Contingency Measures - provided
- Quantitative Milestones for Reasonable Further Progress - provided

Emission Inventory

Emission Inventory

- Inventories provided for:
  - PM10
  - NOx
  - SOx
  - VOC and TOG
  - Ammonia
- 1999 base year – most complete dataset
- 2002 base for emission milestones
- Milestone years 2005, 2008, 2010

Emission Inventory Changes Since Draft Plan Released

- Public unpaved roads down .2%
- Paved roads down 1%
- Ag unpaved roads down 80%
- Private unpaved roads were added (3 tpd)
- Road construction up 2%
- Unpaved traffic areas were added as source category
- Ammonia future year inventories were added
- Growth factors changed for oil and gas production combustion and cogeneration to use numbers consistent with trends

ControlStrategy

Best Available Control Measure Requirement

- Independent of attainment demonstration
- Best Available Control Measures **(BACM)** for area sources
- Best Available Control Technology **(BACT)** for stationary sources
- Transportation Control Measures (TCM) listed in CAA section 108(f)
- Consider energy, environmental impacts and other costs

BACM Analysis Procedures

- Inventory sources of PM10 and PM10 precursors
- Identify significant source categories (contributes 5 µg/m^3 for 24 hr or 1 µg/m^3 for the annual standard)
- Determine if existing control is BACM/BACT
- Evaluate alternative control techniques for technical and economic feasibility
- Select suitable measures to include as SIP commitments

Significant Source Determination

- Based on PM10 mass and speciated data from field study
- Compares mass collected for each pollutant with county emission inventory
- Used very conservative assumptions

De Minimis Emission Levels for the SJVAB in Tons/Day			
NOx	SOx	ROG	PM10
1.3	2.5	2.8	.9

BACM Analysis Results

- Identified new potential upgrades to Reg. VIII – rule development process will determine actual provisions
- Agricultural management practices needed for on field ag fugitive PM10 sources
- BACT needed for stationary source SOx and PM10 - Small boilers, water heaters, glass melting, steam generators, cotton gins
- Stationary source BACT achieved for most NOx and VOC sources due to ozone rules
- Further study required on several source categories

Control Strategy for Directly Emitted PM10

- Fugitive Dust
  - Regulation VIII upgrades
  - Ag Conservation Management Practices Program
  - Local agency/Transportation Planning Agency (TPA) commitments
- Residential Wood Combustion
  - Upgrade Rule 4901
- Stationary/Other Area Sources
  - Directly emitted PM10, SOx controls
  - PM10 precursor controls from Ozone ROP

Control Strategy for PM 10 Precursors

Includes all feasible measures identified for ozone and some new controls

- **Stationary source SOx, NOx and VOC controls (District)**
- **Mobile source NOx and VOC controls (State, Federal)**
- **Incentive programs/TCMs (District, local, TPA)**
- **Need CRPAQS analysis to determine effect of ammonia controls on attainment**

Emission Reduction Summary for 2010

	2002 Inventory (tons/day)	Emission Reduction in 2010 (tons/day)
New PM10 Reductions	353	55
Adopted PM10 Reductions		3
New NOx Reductions	537	32
Adopted NOx Reductions		121
New VOC Reductions	423	12
Adopted VOC Reductions		45
New SOx Reductions	32	6
Adopted SOx Reductions		-

Modeling for the PM10 Plan

Mission: Determine what types and amounts of emission reductions are needed to reach attainment of the air quality standards

Modeling

- Preparation for modeling:
- Analyze air monitoring records to assess which sources contribute to exceedances
- Episode meteorology – evaluate connection to particulate formation and movement
- Statistical analysis – examine identifiable patterns, contributing factors
- Use of Model: Predict how air quality will respond to emission reductions

Ambient Air Quality Monitoring

- Measurements from three years of air quality monitoring, 1999-2001, are used for modeling
- Identifies 24-hour episodes that are over the federal standard
- The annual average for each site is reviewed for compliance with the federal standard
- Additional CRPAQS Dec 1999-Jan 2001 monitoring

24 Hour Sites for Modeling

Bakersfield	
Golden State	**205**
California	**190**
Oildale	**158**
Hanford	**185**
Corcoran	
10/21/99	**174**
12/17/99	**174**
Fresno	
First Street	193
Drummond	186
Clovis	155
Modesto	158
Turlock	157

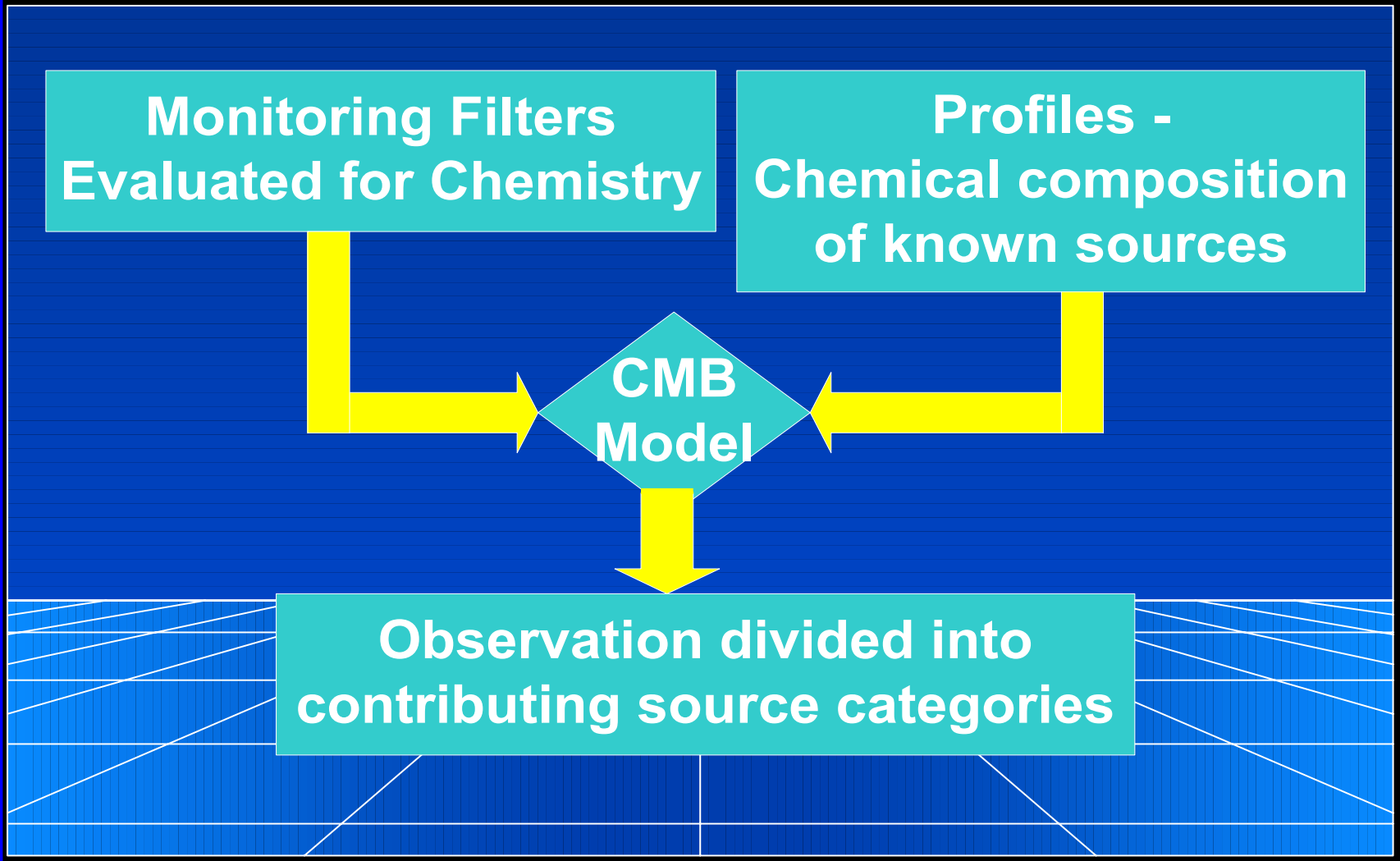
Federal Standard = 150

Annual Sites for Modeling

- Fresno, Fresno – Drummond 50
- Kern, Bakersfield – Golden State 57
- Kings, Hanford – Irwin Street 53
- Tulare, Visalia – Church Street 54

Federal Standard = 50

CMB Modeling Process



Modeling Evaluations

- Chemistry –site specific or supplemental episode chemistry from filter analysis used by modeling to assess the relative influence of actual contributing source types
- Trajectory analysis – assess the probable area of contributing sources
- Pollutant evaluation – consider atmospheric and chemical processes that contribute to particle formation, distribution, flow, aging, settling and other removal processes

Source Profile Selection

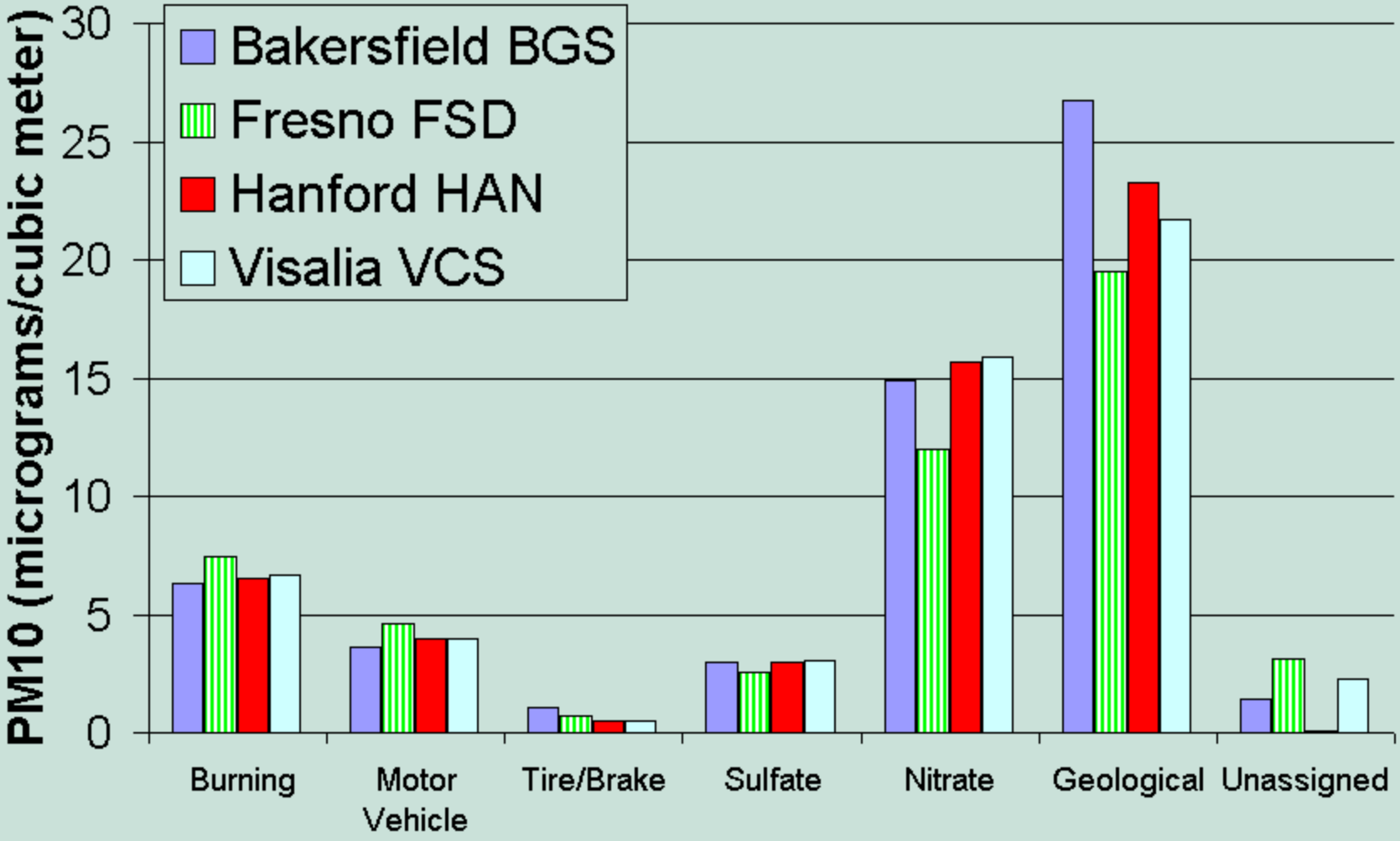
Review crop calendar and seasonal emissions for profile selection. Review new and updated profiles. Prepare special profile selections and composites to match episodes.

Fugitive Dust	50 new soil profiles of various source types and activities collected in 1997 and 1998
Vegetative Burning	Updated profiles for residential and agricultural burning collected in 2000
Mobile Sources	New ARB profiles
Other	Tire-and-brake wear, refinery,and cooking profiles collected in 2000

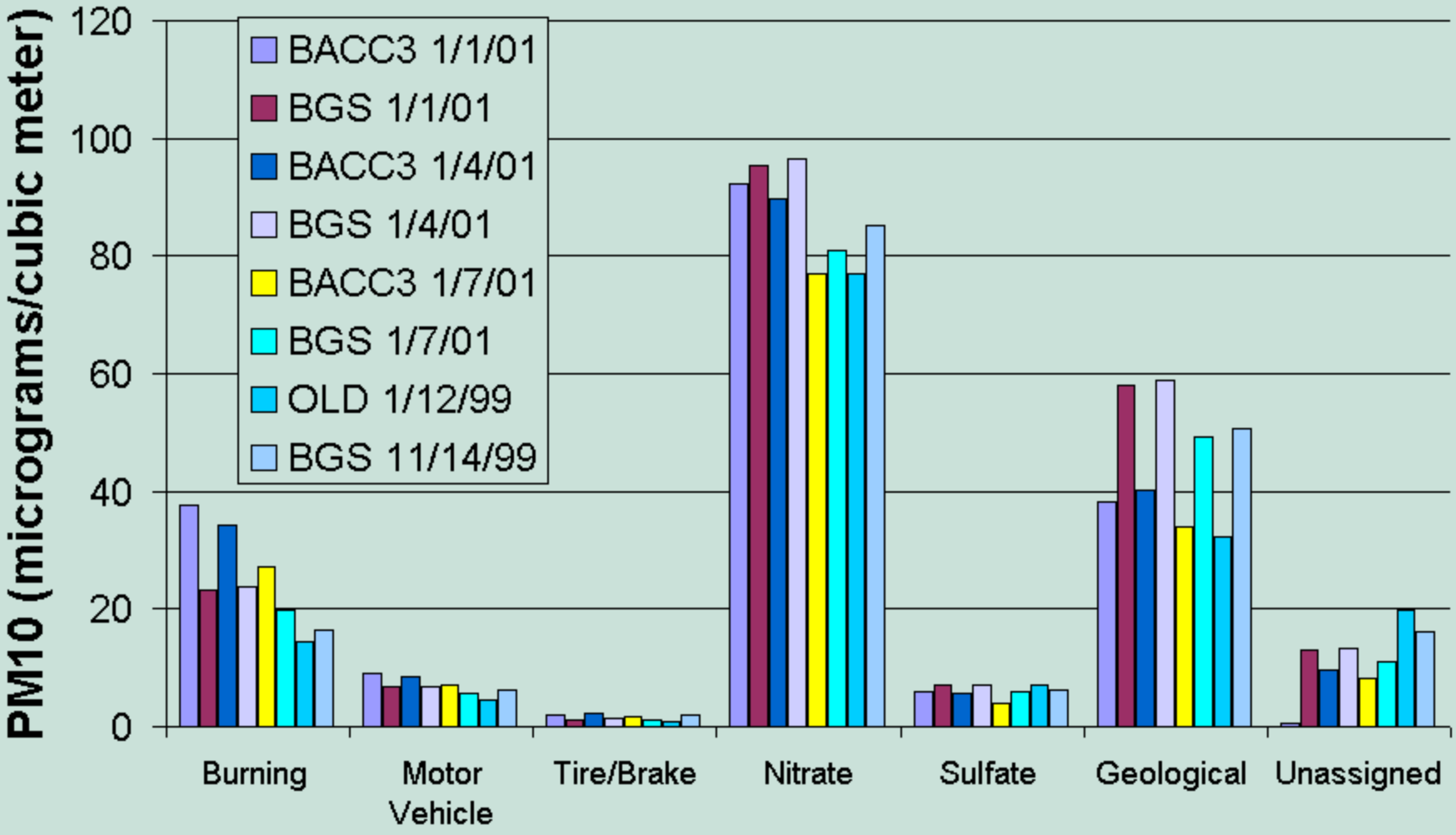
Modeling Profile Testing

- Initial tests performed with standard profiles from EPA and ARB
- Performance review and review of supplemental chemistry selections
- Final modeling with episode specific profiles
- Final performance review: episode specific source profiles improved performance, all analyses meet EPA standards
- Resulting contributing source assessments used for rollback projections

CMB Results - Annual Source Contributions



CMB Results - 24 Hour Episode Analysis



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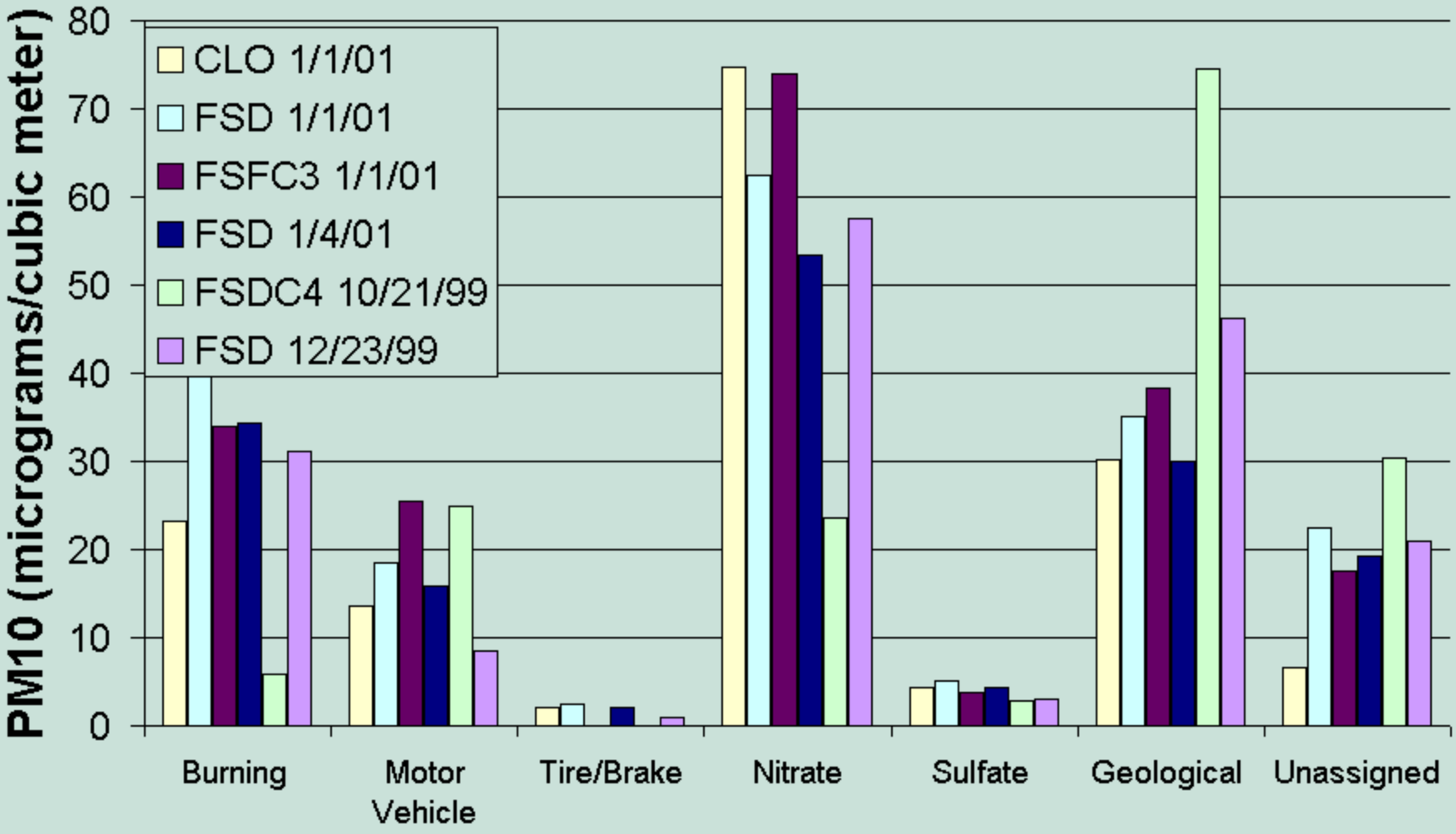

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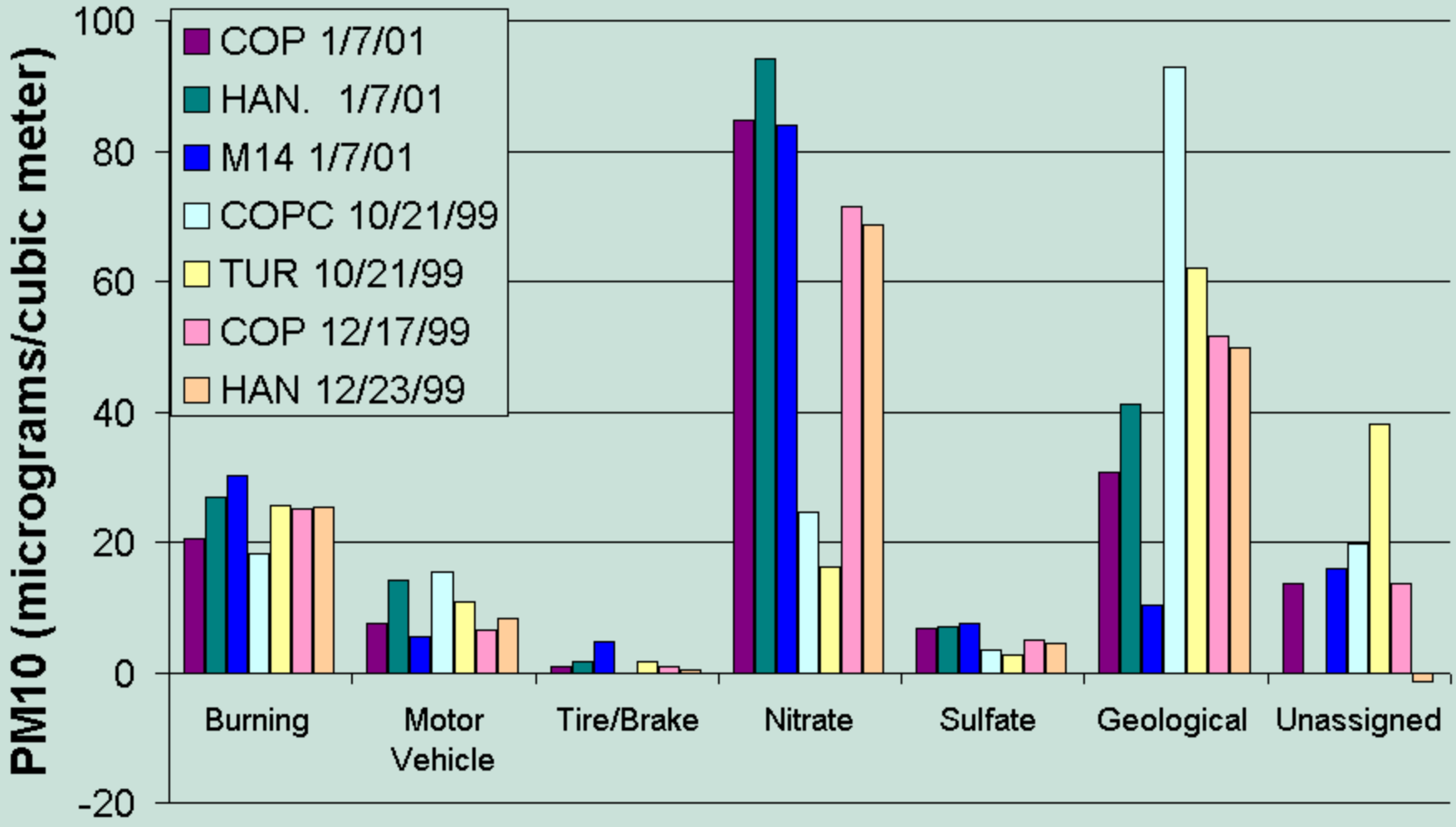
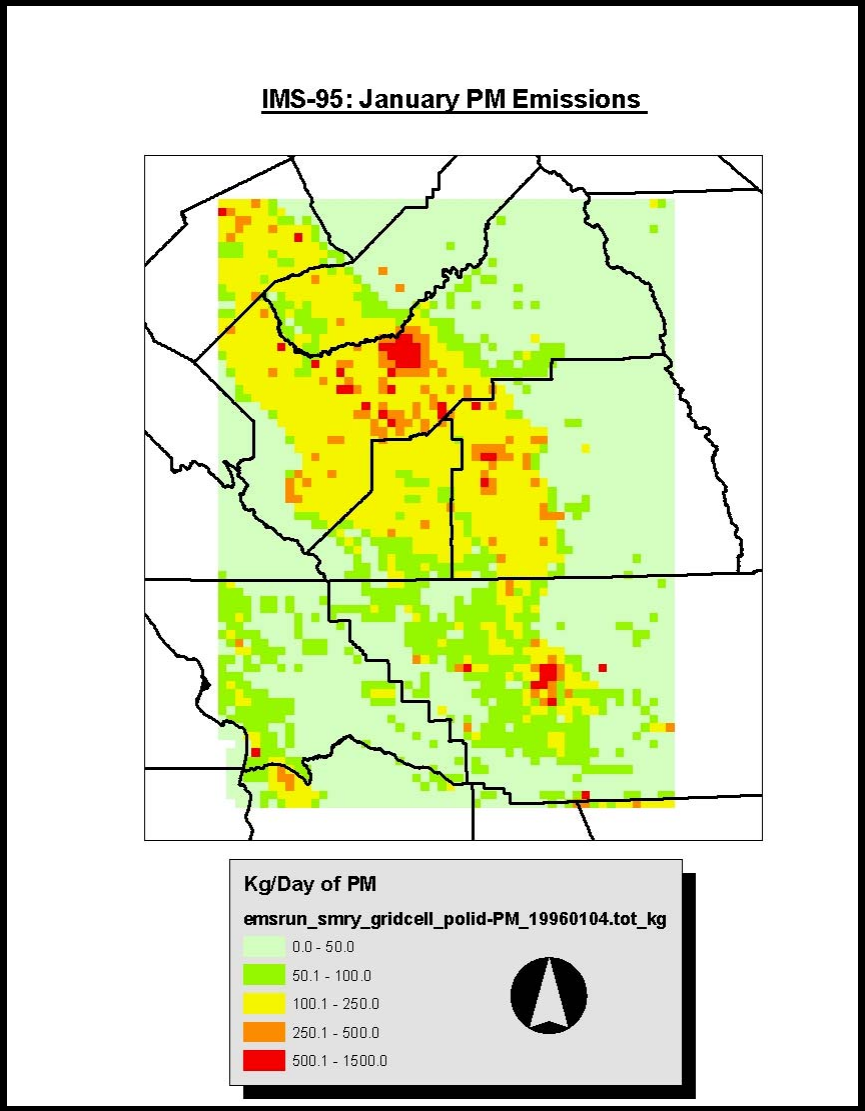


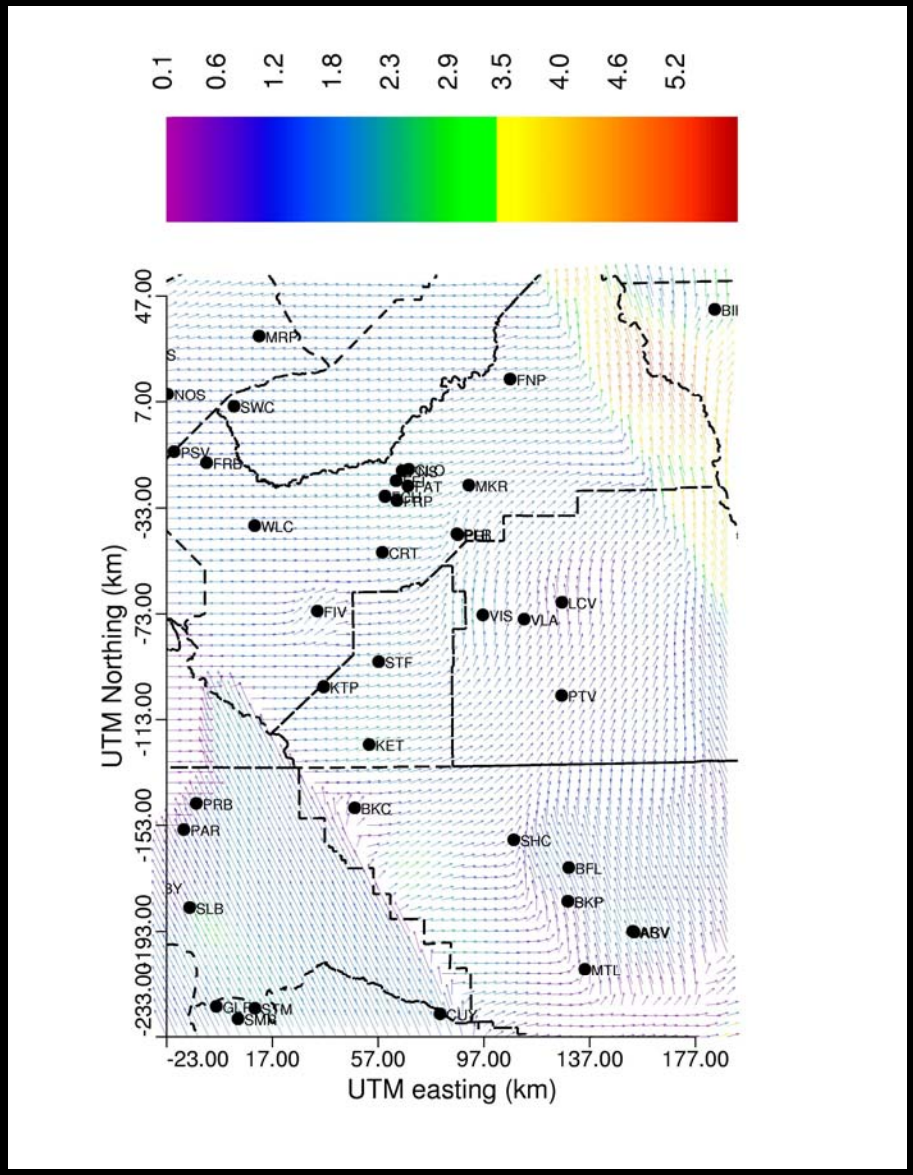
UAM Modeling: Regional Modeling Using UAM-Aero

- Reason – examine NOx and Ammonia formation of nitrate particulates
- Source data – IMS 95, early field program of CRPAQS project
- Results – determine appropriate formation ratio for rollback projection

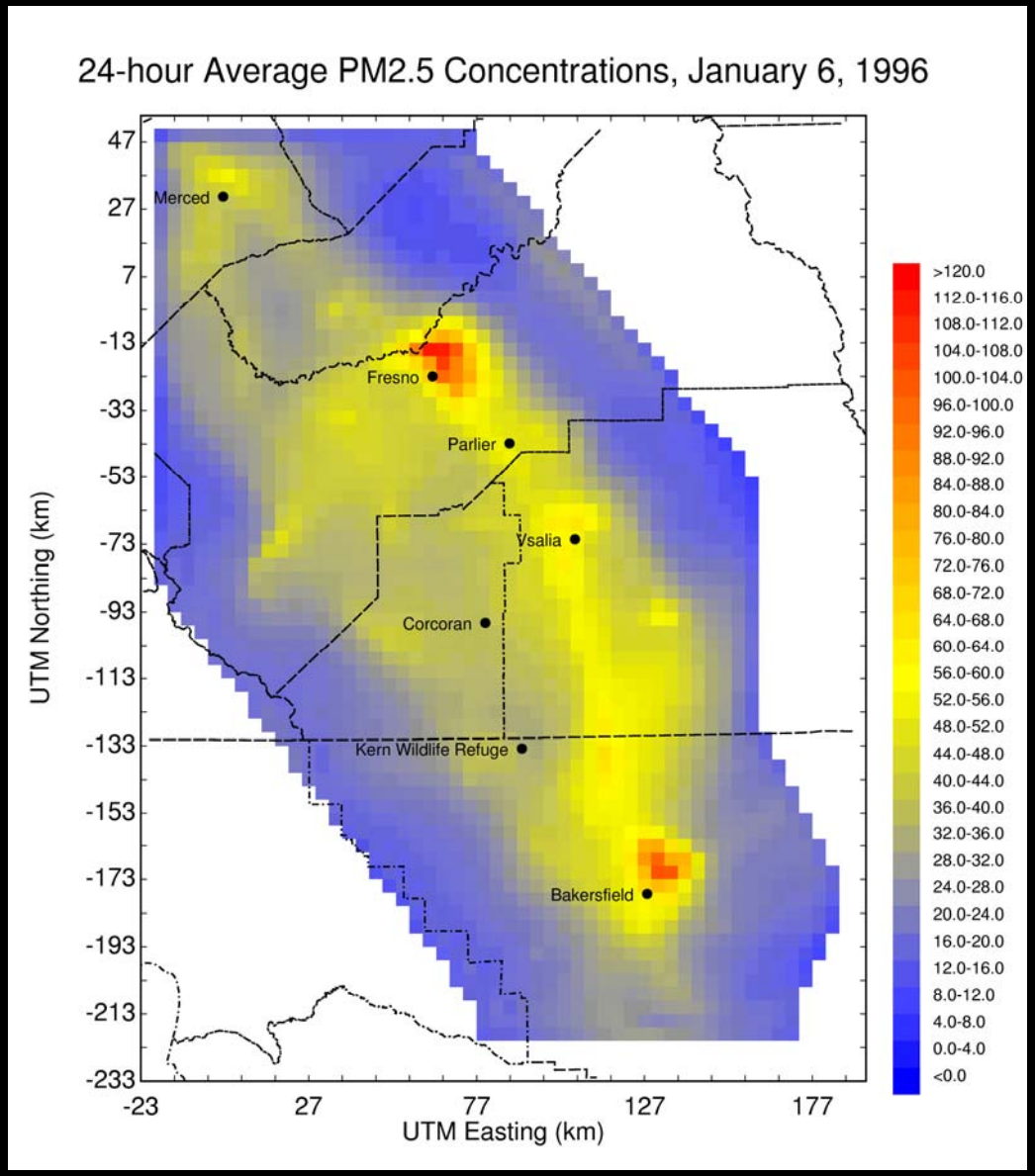
Emissions Inventory for UAM



UAM Meteorological Modeling



Example UAM Modeling Results



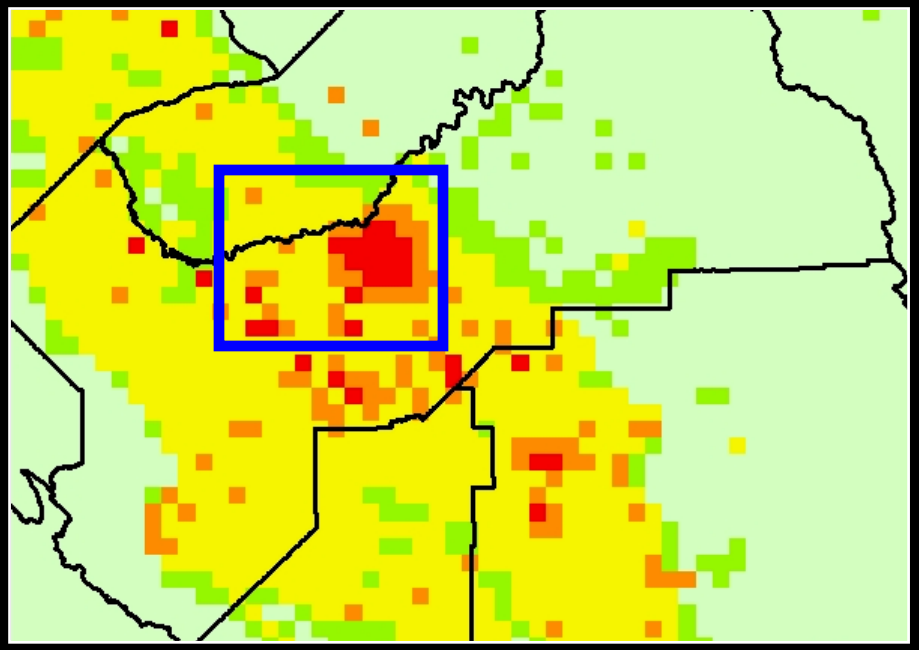
Rollback Projection

- Matches the Emissions Inventory to CMB categories, accounts for contributing source types
- Emission Inventories for 1999 baseline and 2010, with intervening years assessed as needed
- Considers agricultural burning activity, burn and no-burn status
- Residential wood combustion considered in winter episodes and also reflected in annual evaluations
- Wildfires and prescribed burning contributed to exceedances at two sites.

Rollback Projection Process

- Set aside unaffected contributions – natural sources, transport
- Assess PM10 emissions and SOx, TOG, and NOx precursors separately, using the appropriate ratio for NOx-to-nitrate particulate formation
- Use predicted emissions growth and control
- Calculate affect of additional reductions included in the plan
- Area of Influence evaluation used for the worst episodes to provide location specific assessment of response to reductions
- Add back the unaffected emissions to determine the total projected future value

Source Area of Influence



- Determine regional versus local component
- Related to source type typical particle size
- Based on meteorology and length of episode

Background Concentrations

- Source category specific contributions
  - Natural source fugitive particulate
  - Biogenic particulate and precursors
  - Natural and transported ammonium nitrate and sulfate particulate
  - Sea salt airborne particulate
- Based on technical literature and analysis

Modeling Results

- Detailed questions will be addressed in the Technical Workshop on April 10
- Annual – all sites will meet standard by 2010
- 24-Hour Episodes – all sites will meet standard by 2010
- Some District sites currently meet standards, modeling indicates some will attain before 2010, but the earliest practical date for attainment at all sites is 2010

Modeling: 24 Hour 2010 Results

Bakersfield	
Golden State	**154**
California	**148**
Oildale	**128**
Hanford	**143**
Corcoran	
10/21/99	**136**
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Modeling: Annual 2010 Results

- Fresno, Fresno – Drummond 44
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Contingency Measures and Further Study Measures

PM 10 Plan Contingency Measures

- Regulation VIII additional controls – reexamine less effective measures
- Conservation Management Practices Program - additional measures if expected participation not achieved
- Local measures – additional local measures if commitments not achieved

PM 10 Plan Further Study Measures

- Leaf blowers – inventory development and potential control measure
- Fleet vehicle rule – inventory development to determine potential reductions
- Solid fuel boilers – Investigate existing units
- Can & Coil Coatings – inventory
- Soil decontamination – inventory
- CAFO ammonia and VOC – inventory and modeling

CRPAQS Modeling Schedule

- Spring 2003 - Initiate in-house modeling efforts for CRPAQS episodes
- Spring 2003 - Release RFP for external modeling support
- Summer 2003 - Initiate UCD modeling for CRPAQS episodes
- Fall 2003 - Begin contracts for external modeling support
- Winter 2004 - Preliminary findings from in-house modeling
- Summer 2004 - Preliminary findings from UCD modeling
- Fall 2005 - Modeling contracts complete

PM10 Plan Adoption Schedule

- Comment period on Draft Plan ends April 21, 2003
- Governing Board Receive and File PM10 Plan May 15, 2003
- Governing Board Hearing on PM10 Plan June 19, 2003
- Air Resources Board consider PM10 Plan June 26, 2003
- ARB submits Plan to EPA July 2003

Questions and Comments

Comments on Draft 2003 PM 10 Plan

- Deadline for comments: April 21, 2003
- Contact Person: Dave Mitchell
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Thank You

For participating

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